

34. (New) The system of claim 33, wherein the copper alloy seed layer is deposited directly on the TaN barrier layer.

35. (New) The system of claim 19, wherein the atomic layer deposition barrier chamber is for depositing a TaN barrier layer.

36. (New) The system of claim 22, wherein the atomic layer deposition barrier chamber is for depositing a TaN barrier layer.

37. (New) The system of claim 36, wherein the metal seed layer is deposited directly on the TaN barrier layer.

38. (New) The system of claim 27, wherein the atomic layer deposition barrier chamber is for depositing a TaN barrier layer.

REMARKS

This is intended as a full and complete response to the Restriction Requirement dated May 12, 2003, having a shortened statutory period for response set to expire on June 12, 2003. Claims 1-29 are pending and are subject to a restriction requirement. In this response, Applicants have amended claims 7, 9, 11, 12, 14, 16, 17, 19, 20, 22, 24, 25, 27, and 28 and have canceled claims 8, 10, 13, 15, 18, 21, 23, 26, and 29 without prejudice. Applicants have added new claims 30-38. Applicants provisionally elect Group III with traverse.

Claims 1-29 stand restricted under 35 U.S.C. § 121 as follows:

I. Claims 1-3, drawn to a target of physical vapor deposition, classified in class 438, subclass 256.

II. Claims 4-6, drawn to a process chamber, classified in class 422, subclass 135.

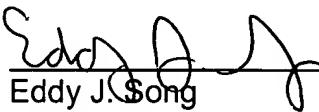
III. Claims 7-29, drawn to a system for processing a substrate, classified in class 422, subclass 157.

The Restriction Requirement states that Group I and Group II are related as combination and subcombination on grounds that the combination as claimed does not require the particulars of the subcombination as claimed because Group I is a metallization on a substrate and Group II is where the metallization is carried out. The Restriction Requirement further states that the subcombination has separate utility such as depositing a contact on a FET while the chamber could be used to epitaxially grow a semiconductor layer on a substrate.

The Restriction Requirement also states that Group II and Group III are related as combination and subcombination on grounds that the combination as claimed does not require the particulars of the subcombination as claimed because Group II is a reaction chamber and Group III is an apparatus for vapor deposition. The Restriction Requirement further states that the subcombination has separate utility such as Group II has a single chamber while Group III is a system, which could contain a plurality of chambers.

Applicants provisionally elect Group III with traverse. Group III includes claims 7, 9, 11, 12, 14, 16, 17, 19, 20, 22, 24, 25, 27, and 28 and new claims 30-38. Applicants respectfully request withdrawal of the restriction requirement to permit prosecution of claims 1-6.

Respectfully submitted,



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APPENDIX

7. (Amended) A system for processing a substrate, comprising:
at least one atomic layer deposition barrier chamber for depositing a barrier layer;
[a first] at least one metal seed chamber for depositing a copper alloy seed layer over the barrier layer, wherein the copper alloy seed layer comprises copper and a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof and wherein the metal is present in the copper alloy in a concentration between about 0.01 atomic percent and about 2.0 atomic percent.
9. (Amended) The system of claim 7, wherein the [first] metal seed chamber is selected from the group consisting of a physical vapor deposition metal seed chamber, a chemical vapor deposition metal seed chamber, an atomic layer deposition metal seed chamber, and an electroless deposition metal seed chamber.
11. (Amended) The system of claim [8] 7, wherein the [first] metal seed chamber is a physical vapor deposition metal seed chamber [and the second chamber is an atomic layer deposition chamber].
12. (Amended) The system of claim [8] 7, further comprising one or more transfer chambers [in communication with the first] for transferring a substrate between the atomic layer deposition barrier chamber and the [second] metal seed chamber.
14. (Amended) A system for processing a substrate, comprising:
at least one atomic layer deposition barrier chamber for depositing a barrier layer;
[a first] at least one copper alloy seed chamber for depositing a copper alloy seed layer over the barrier layer, wherein the copper alloy seed layer comprises copper and a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, and

[a second] at least one undoped copper seed chamber for depositing an undoped copper seed layer over the copper alloy seed layer.

16. (Amended) The system of claim 14, wherein the [first] copper alloy seed chamber is selected from the group consisting of a physical vapor deposition copper alloy seed chamber, a chemical vapor deposition copper alloy seed chamber, an atomic layer deposition copper alloy seed chamber, and an electroless deposition copper alloy seed chamber.

17. (Amended) The system of claim 14, wherein the [second] undoped copper seed chamber is selected from the group consisting of a physical vapor deposition undoped copper seed chamber, a chemical vapor deposition undoped copper seed chamber, an atomic layer deposition undoped copper seed chamber, and an electroless deposition undoped copper seed chamber.

19. (Amended) The system of claim [15] 14, wherein the [first] copper alloy seed chamber is a physical vapor deposition copper alloy seed chamber[, the second] and the undoped copper seed chamber is a physical vapor deposition undoped copper seed chamber[, and the third chamber is an atomic layer deposition chamber].

20. (Amended) The system of claim 15, further comprising [a] one or more transfer chambers for transferring a substrate between the atomic layer deposition barrier chamber, the copper alloy seed chamber, and the undoped copper seed chamber [in communication with the first chamber, the second chamber, and the third chamber].

22. (Amended) A system for processing a substrate, comprising:
at least one atomic layer deposition barrier chamber for depositing a barrier layer;

[a first] at least one metal seed chamber for depositing a metal seed layer over the barrier layer, wherein the metal seed layer comprises a metal selected from the

group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, and

[a second] at least one undoped copper seed chamber for depositing an undoped copper seed layer over the metal seed layer.

24. (Amended) The system of claim 22, wherein the [first] metal seed chamber is selected from the group consisting of a physical vapor deposition metal seed chamber, a chemical vapor deposition metal seed chamber, an atomic layer deposition metal seed chamber, and an electroless deposition metal seed chamber.

25. (Amended) The system of claim 22, wherein the [second] undoped copper seed chamber is selected from the group consisting of a physical vapor deposition undoped copper seed chamber, a chemical vapor deposition undoped copper seed chamber, an atomic layer deposition undoped copper seed chamber, and an electroless deposition undoped copper seed chamber.

27. (Amended) The system of claim 23, wherein the [first] metal seed chamber is a physical vapor deposition metal seed chamber[, the second] and the undoped copper seed chamber is a physical vapor deposition undoped copper seed chamber[, and the third chamber is an atomic layer deposition chamber].

28. (Amended) The system of claim 23, further comprising [a] one or more transfer chambers for transferring a substrate between the atomic layer deposition barrier chamber, the metal seed chamber, and the undoped copper seed chamber [in communication with the first chamber, the second chamber, and the third chamber].